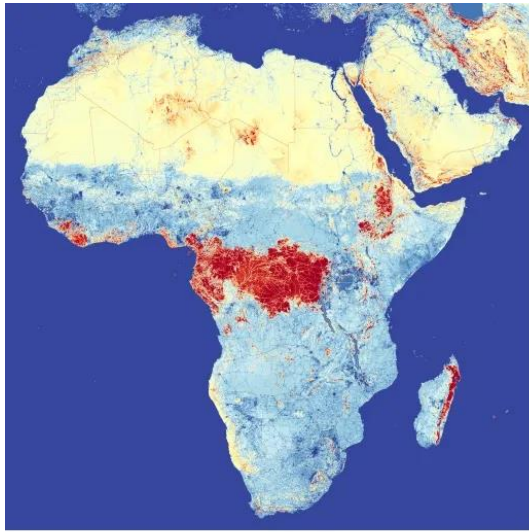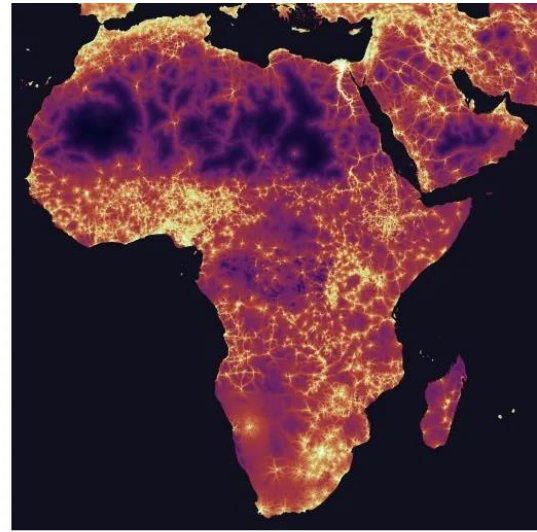## Mapping Travel Times to Assets

Global Friction Surface (min/km)

0   60

Accessibility to Cities (min)

0   10   100   1K   10K

Example of friction surface (left) and accessibility to cities represented in how many minutes needed to access the nearest city (right) (Source: MAP (university of Oxford))

Product Category

■ Land Use	☐ Natural Disaster	☐ Coast Management	☐ Earth's Surface Motion
☐ Land Cover	☐ Climate Change	☐ Marine	

Financial Domain(s)

■ Investment management ☐ **Risk analysis** ☐ **Insurance management** ☐ **Green finance**

User requirements

UN11: Realistic assessment of accessibility to assets

Description

Global Friction Surface is a map produced through a collaboration between the Malaria Atlas Project (MAP) (University of Oxford), Telethon Kids Institute (Perth, Australia), Google, and the University of Twente, Netherlands. Friction surface is a map relative measures how "hard" it is to cross a grid cell, based on whether the cell contains good roads, worse roads, railroads, rivers, various water bodies, or terrain with some slope. These maps quantify the time required to traverse each pixel within a ~1 km × 1 km gridded representation of the Earth's surface. Using this map, we can generate travel times maps from any place to another. The importance of these comes come from that places a longer distance away may take less time to reach physically closer places.

Spatial coverage target

Asset Level

Data throughput

Rapid tasking	☐ High	■ Low
Data availability	☐ High	■ Low

Product specifications	
Main processing steps	The process starts by clipping the Global Friction Surface 2019 to the surrounding area of the asset. Knowing that each pixel (~ 1 km x 1km) of these maps represents a value of a time in minutes needed to cross one meter of that pixel walking only and using motorized means. Using these maps by identifying a line representing the way to the asset, it is possible to calculate the travel time by accumulating the pixels' values of the friction surface map. The way from a pixel to the asset can be the nearest distance (using algorithms) or any way identified by the asset's owner.
Input data sources	Optical: N.A Radar: N.A Grid-based data: Global Friction Surface 2019 Supporting data: N.A
Accessibility	Freely and publicly available through MAP (university of Oxford)
Spatial resolution	~ 1 km
Frequency (Temporal resolution)	Annually only for 2019
Latency	N.A
Geographical scale coverage	Globally
Delivery/ output format	Data type: Raster File format: GeoTIFF
Accuracies	Thematic accuracy: 80-90% Spatial accuracy: N.A
Constraints and limitations	■ The relatively coarse spatial resolution (~ 1 km) ■ It is static and may not account for dynamic factors like traffic congestion, seasonal changes, or road closures, which can impact travel times. ■ It represents the travel time of using motorized means without considering the type of vehicle.
Level of skills required by users to use the EO service	Skills: Essential Knowledge: Essential